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MARS ELEVATION DISTRIBUTION, Sherman S. C. Wu, Annie E. Howington-Kraus, and Karyn Ablin, U.S. Geological Survey, Flagstaff, AZ 86001

A Digital Terrain Model (DTM) of Mars has been derived with both Mercator and Sinusoidal Equal-Area Projections from the global topographic map of Mars (scale 1:15 million, contour interval 1 km [1]). Elevations on the map are referred to the Mars' topographic datum that is defined by the gravity field at a 6.1-millibar pressure surface with respect to the center of mass of Mars [2]. The DTM has a resolution at the equator of 1/59.226° (exactly 1 km) per pixel [3]. By using the DTM, the volumetric distribution of Mars topography above and below the datum has previously been calculated [4]. Three types of elevation distributions of Mars' topography have now been calculated from the same DTM: (1) the frequency distribution of elevations at the pixel resolution (Figure 1); (2) average elevations in increments of 6° in both longitude and latitude (Figure 2); and (3) average elevations in 36 separate blocks, each covering 30° of latitude and 60° of longitude (Table 1).

In Figure 1, the fractional areas having positive and negative elevation are shown to be 67% and 33%, respectively. Only 0.5% of elevations are above 9 km. In Table 1, the average elevations of each of the six longitudinal belts are listed on the bottom row, and the average elevations of each of the six latitudinal bands are listed in the last column. In elevation, the western hemisphere (0°-180°) averages about 0.993 km higher than the eastern (180°-360°). Also, the southern hemisphere averages about 3.191 km higher than the northern (due to a shifting of Mars' center of mass by approximately 3.4 km to the north of its center of figure). The mean elevation above the 6.1mb datum is 1,876 m.

Mars elevation distribution correlates with its volume distribution previously calculated [4].

References: [1] U.S. Geological Survey, 1989, Misc. Inv. Ser. Map I-2030, 3 sheets. [2] Wu, S. S. C., 1981, Annales de Geophysique, Centre National de la Recherche Scientifique, Numero 1, Tome 37, p. 147-160. [3] Wu, S. S. C., and Howington-Kraus, A. E., 1987, LPS XVIII, p. 1108-1109. [4] Wu, S. S. C., and Howington-Kraus, A. E., 1990, LPS XXI, p. 1355-1357.

Table 1. Elevation Distributions of Mars' Topography (in meters).

Longitude(w) / Latitude	180°-120°	120°-60°	60°-0°	360°-300°	300°-240°	240°-180°	Average
N90°-60°	-1,940	-1,463	-2,313	-1,461	-1,258	-2,581	-1,836
N60°-30°	-1,030	2,343	-1,370	612	-899	-1,038	-230
N30°-0°	768	4,257	-445	1,569	399	-330	1,037
S0°-30°	3,803	6,980	1,519	3,336	3,045	2,232	3,264
S30°-60°	5,016	5,441	3,218	3,023	461	4,247	3,568
S60°-90°	4,232	3,832	3,698	3,252	3,591	4,470	3,846
Average	2,026	4,392	699	2,011	937	1,190	1,876

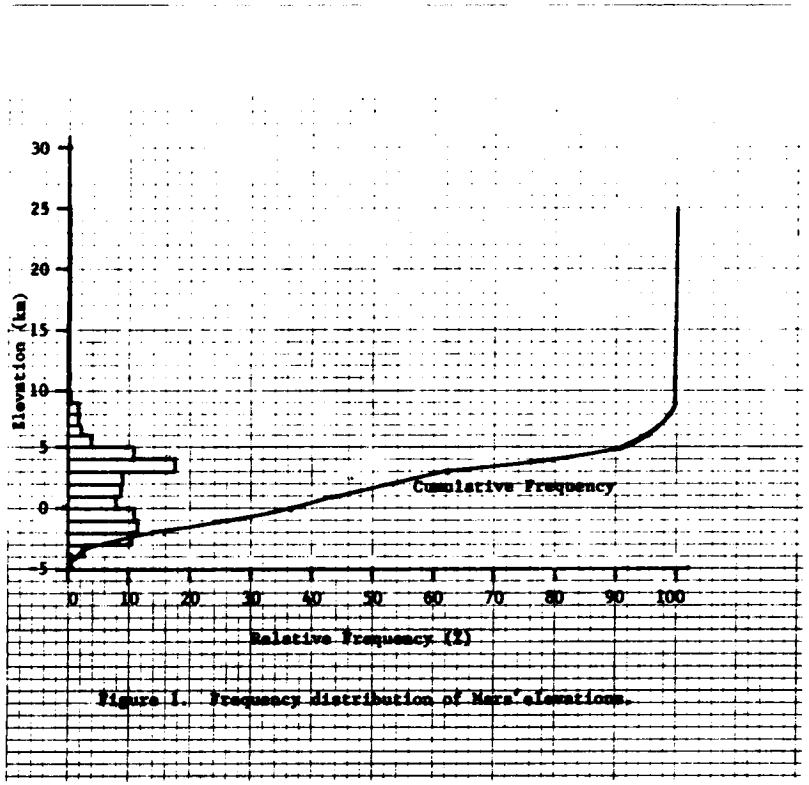

Figure 1. Frequency distribution of Mars' elevations.

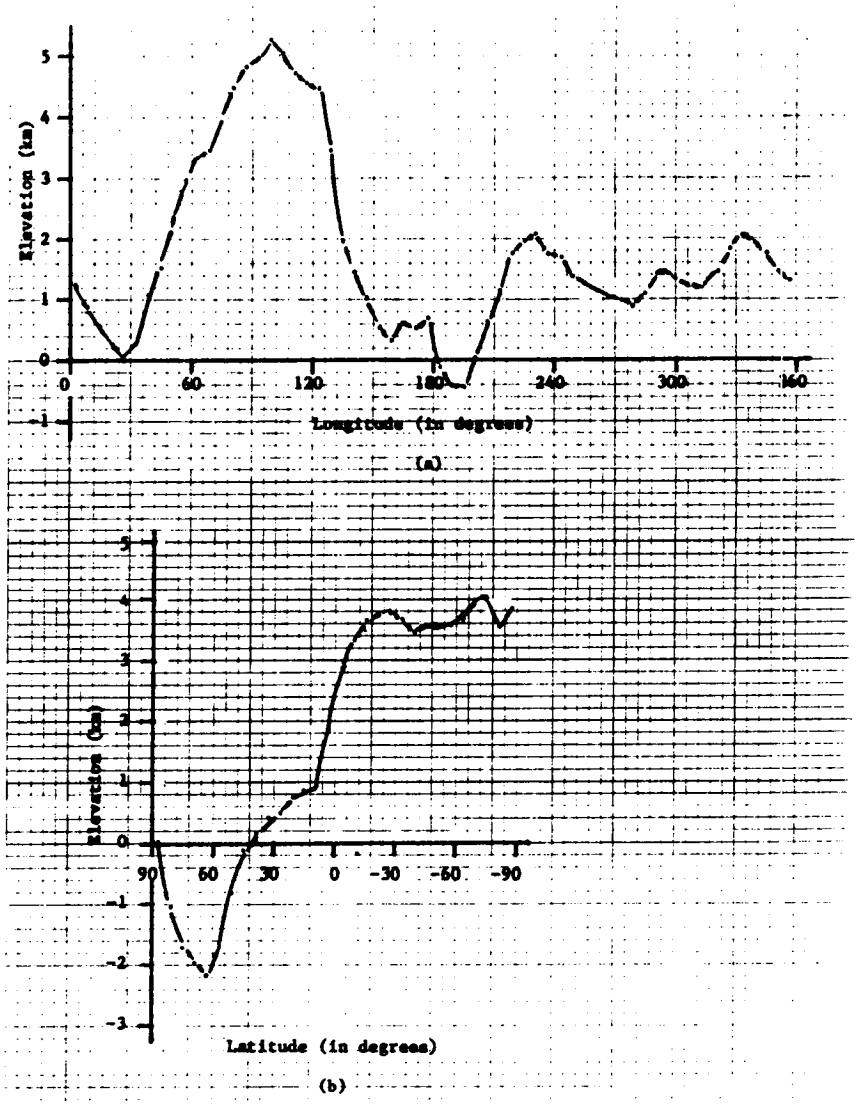

Figure 2. Elevation distribution of Mars' topography (a) based on longitude, (b) based on latitude